Demand Characteristics of New PCS

Presented by
Andrew Roscoe
CEO
MTA-EMCI

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MTA EMCI
COMMUNICATIONS CONSULTANTS

MTA-EMCI
1130 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 835-7800

Introduction.

My name is Andrew D. Roscoe. I am CEO of MTA-EMCI (Malarkey-Taylor Associates, Inc. and Economic and Management Consultants International, Inc.). MTA-EMCI is a consulting firm specializing in the analysis of the wireless telephony and cable television industries. Within MTA-EMCI, EMCI is responsible for mobile radio analysis. Since 1987, EMCI has consulted to cellular, paging, SMR, and mobile satellite carriers and equipment manufacturers on service, technology, demand, and service issues. More recently, EMCI has consulted to cellular carriers, new PCS carriers, and other interested parties concerning PCS service definitions, market demand, strategic plans, and optimal system design. In addition, EMCI co-authored this year a 47 volume study with Moffet, Larson & Johnson, Inc. titled PCS: Market Demand and System Engineering. Through our consulting in all of the major wireless industries, we have compiled a wealth of data on consumer behavior exhibited with existing technologies, as well as likely behavior as new services roll out. My remarks today concern potential demand characteristics for new PCS based on this research.

New PCS is evolutionary, not revolutionary.

Paging services have been available for decades, and cellular telephone service has been available since the early 1980s. Recent advancements in technology and production have created a new generation of cellular telephones which are small, lightweight, relatively inexpensive, and with high quality digital transmission capability. Digital technology and the implementation of intelligent network features on mobile radio networks are enabling the implementation of new services such as enhanced call forwarding, new mobile data services, and more ergonomic handsets.

New PCS services will be implemented using advanced digital technology will offer the most recent service enhancements and will stimulate additional innovation. However, due to the nature of digital technology, advancements will likely be highly portable across wireless networks. Because existing cellular systems are already moving toward new service concepts, and because technology will tend to be transportable across services, EMCI believes that services provided by new PCS carriers will be a next step rather than a quantum leap in the evolution of mobile services. The development of innovative services will accelerate with the additional market competition generated by new carriers.

Based on this evolution of services, MTA-EMCI's demand projections for new PCS assume services that initially offer a high-mobility, wide coverage area service similar to modern cellular systems. These forecasts are discussed in detail below.

In addition to high-mobility mobile telephone services with near-universal coverage, there will also likely be new services including mobile data, local loop bypass, and low mobility services. The availability of unlicensed PCS frequencies will encourage the development of unlicensed in-building applications in conjunction with licensed public applications.

With the introduction of new PCS, EMCI projects a total mobile telephone market of 87 million by the year 2004.

EMCI projects the total U.S. mobile telephone (voice) market will reach 87 million subscriptions by 2004 (see Figure 1). Of this total, EMCI projects 56 percent of subscriptions to be on cellular systems, 32 percent to be on PCS systems, and 12 percent to be on digital SMR systems (see Figure 2). There will likely be significant overlap in subscriptions, particularly between business-purchased mobile services and personal mobile services (e.g., one person with subscriptions to an ESMR system and a cellular system). There will also likely be significant overlap between voice systems and future messaging systems, including mobile data and one- and two-way paging.

New PCS will play a critical role in the expansion of the wireless market into new demand segments. The additional spectrum, lower prices, and increased pace of service innovation generated by the addition of new PCS carriers will contribute to rapid market development.

EMCI's demand methodology is based on consumer research, trending analysis, and product diffusion analysis.

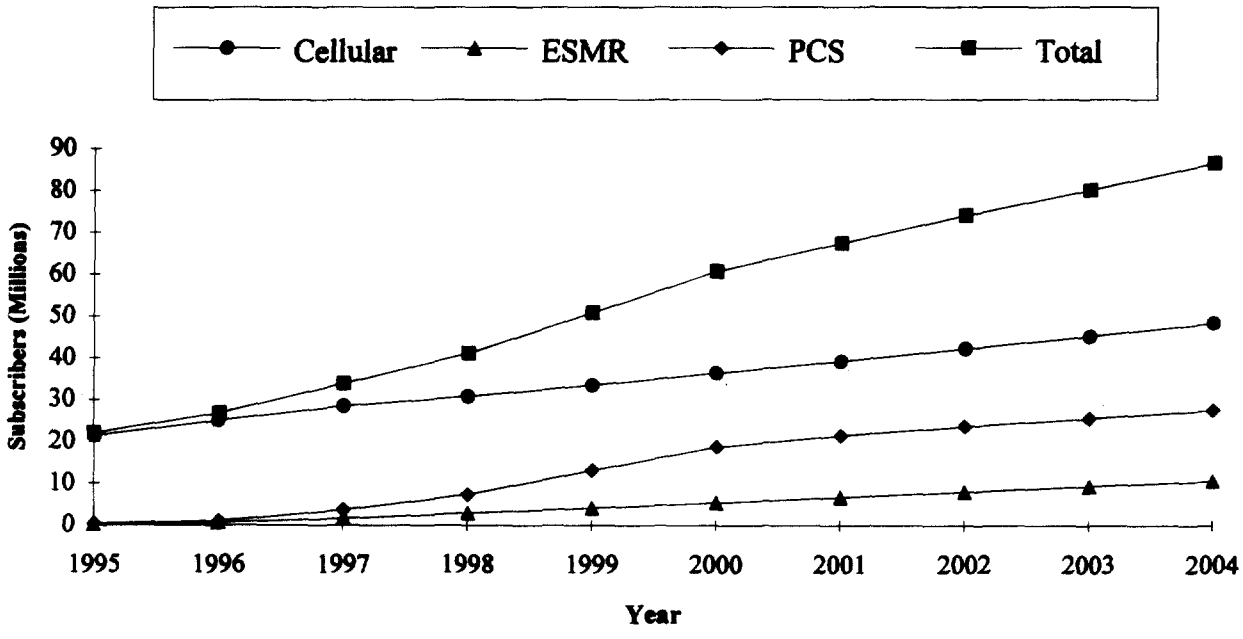
EMCI's demand methodology is based on on-going research. It is not a statistical methodology, but is based on several factors, including:

- surveys of consumers on attitudes toward mobile radio purchases (conducted quarterly by EMCI);
- studies of product diffusion curves of other consumer products;
- non-linear trending of mobile radio subscriptions in existing mobile markets; and
- analysis of the cross-competitive nature of future markets based on evolving technologies and consumer preferences.

These forecasts are based on several key assumptions and market developments:

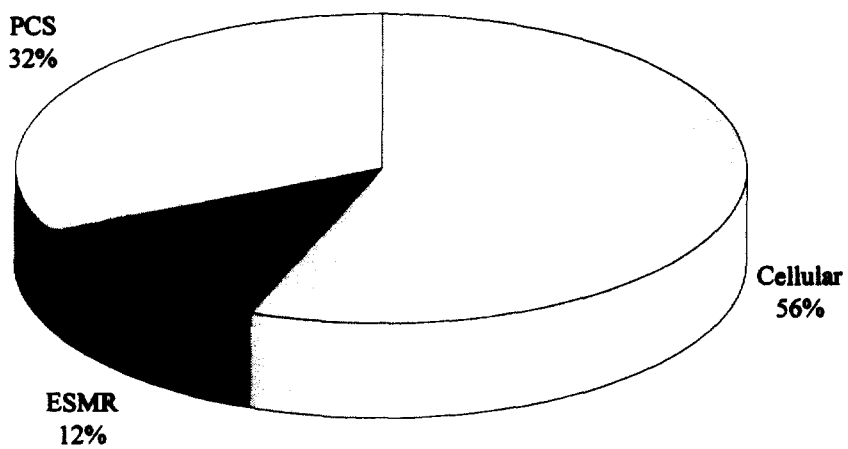
- Licensing of new PCS carriers by the end of 1994.
- Limited use of PCS as a bypass technology in the first five years of PCS.
- The forecasts recognize the development of unlicensed applications but do not include counts of these users.
- The average monthly bill is assumed to fall to between $40 and $50 per month. Usage is forecast to be somewhat higher than today's average usage levels due to the impact of lower price levels and usage price elasticities.

Figure 1 Total Mobile Telephone Subscribers
1995-2004



Source: EMCI, Inc.

Figure 2 Mobile Telephone Market Share by Type of Licensee, 2004



Source: EMCI, Inc.

Because the forecasts are not statistically based, they do not have statistically measurable forecast error.

Upper-middle income households represent a significant untapped market.

The recent explosion in cellular and paging have been driven primarily by a dramatic increase in consumer demand for mobile radio products. Since 1990, cellular has shifted from 40 percent personal use to over 50 percent personal use (based on EMCI CELLTRAC surveys, see Figure 3). Paging was virtually all business users as recently as 1990. Today, approximately 50 percent of new paging users are personal users (based on EMCI PAGETRAC surveys).

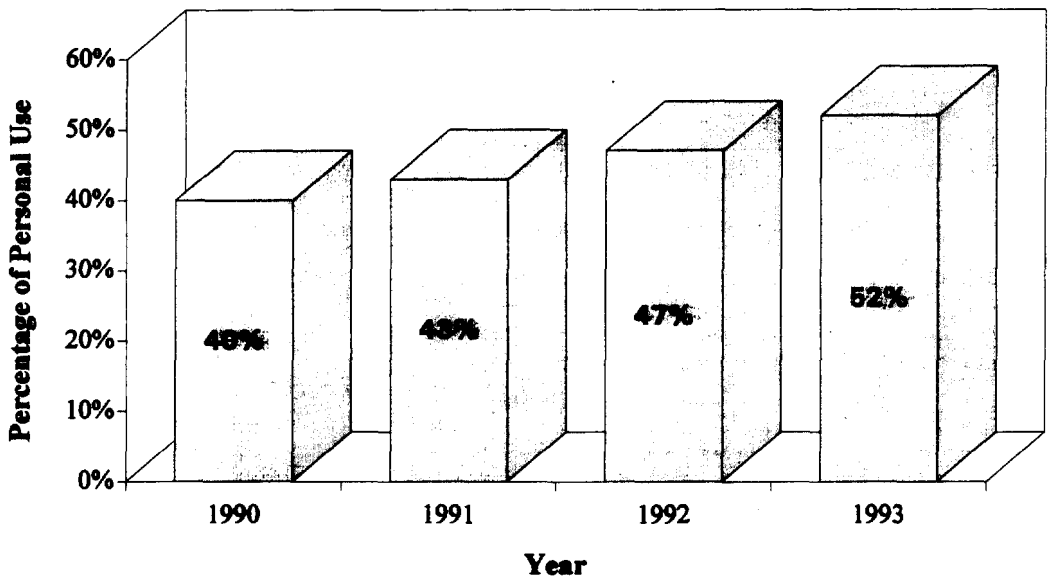
In addition to increased consumer awareness, part of the explosion in personal use has been due to dramatically falling prices - telephone prices in the cellular industry and pager and service prices in the paging industry. As a result of lower prices of cellular telephones, the primary barrier to purchase for consumers interested in cellular but not yet subscribers is now service price. For the first decade of cellular, the primary barrier to purchase was the cost of a cellular telephone. Thus, the next generation of mobile radio services (regardless of whether they are offered by cellular, ESMR, or new PCS carriers) must address service pricing in order to penetrate the next strata of the consumer market.

As the average price of cellular telephones has fallen, so too has the average income of cellular users. The average income of a cellular user has declined significantly from the early 1980s to approximately $66,000 in 1992. However, EMCI research indicates substantial potential demand for consumers in the top half of the income distribution, or households with greater than approximately $30,000 per year. Thus, the largest untapped market for mobile services will likely come from households with incomes from $30,000 to $65,000. This largely untapped market will be very sensitive to reductions in service pricing.

The entry of new PCS carriers will clearly encourage a greater degree of service price competition. The resulting lower service prices will have two impacts. First, it will help the industry more quickly realize the untapped, price-sensitive consumer market. Second, it will tend to increase the average monthly use of wireless subscribers.

The average minutes of use by cellular subscribers has declined steadily in recent years as more price-sensitive personal users come on line. Lower service pricing driven by new competition will tend to increase usage. These usage elasticity effects may offset the historical decline in monthly use due to the addition of new more price sensitive subscribers over time. As a result, monthly use per subscriber may increase somewhat in the future relative to current usage levels.

Figure 3 Percentage of Personal Use of Cellular Telephones, 1990-1993



Source: EMCI, Inc.

EMCI has determined that consumers have a strong desire for wide area coverage and easy to use service wherever they travel. This desire has long been understood by the cellular industry which has spent billions consolidating control over wide areas and investing in switch-to-switch communications to enhance wide area usage. This desire for wide area systems will be a critical consideration for new PCS. EMCI believes the current MTA license areas represent a minimum viable stand-alone service area.

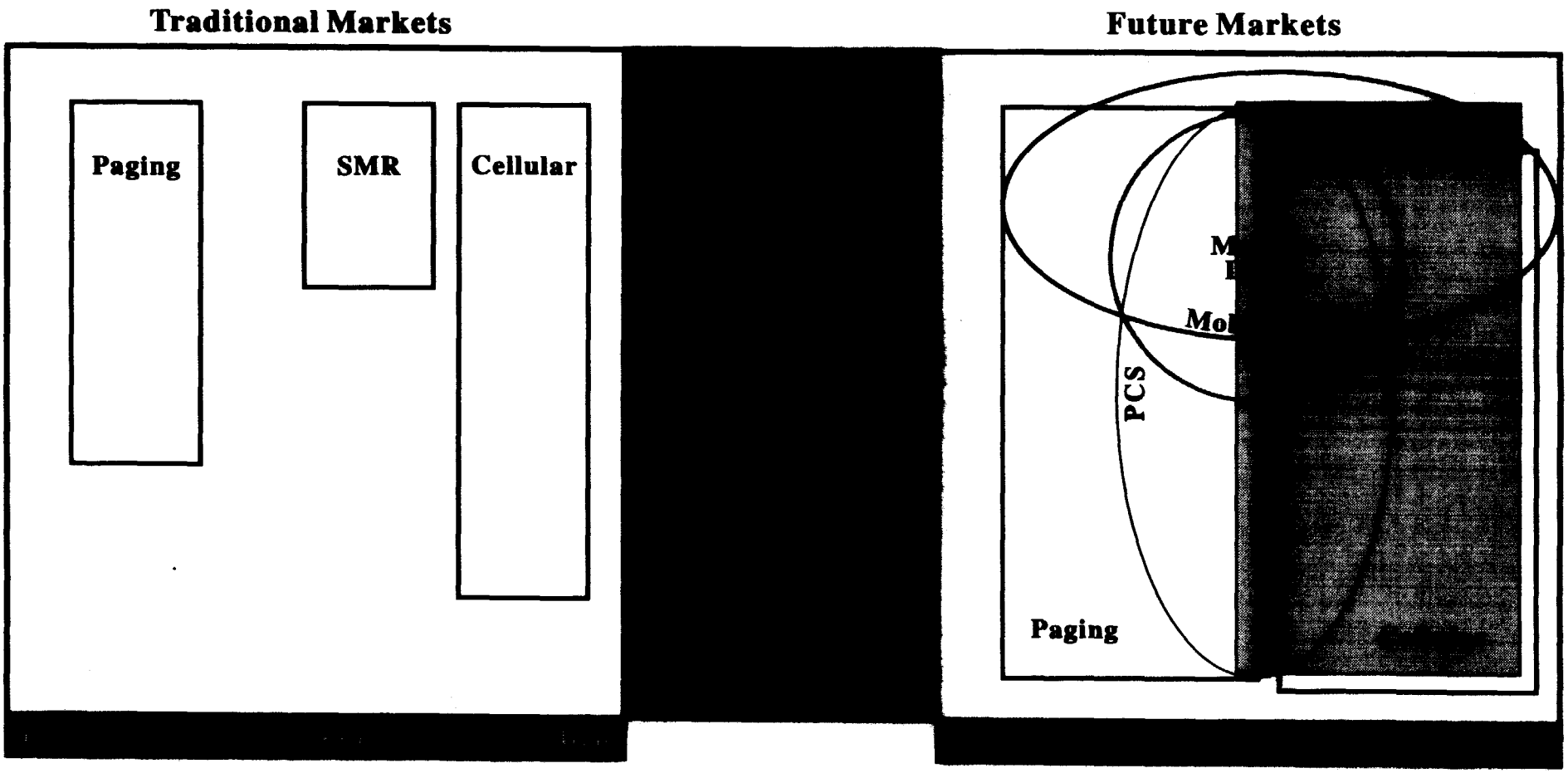
Significant licensing delay will negatively impact new PCS.

In 1993, the cellular industry achieved an astonishing net subscriber growth of approximately five million. This represents an annual increase of 45 percent after nine years of cellular operation. Forecasts for mobile services have consistently played catch-up with the reality of a subscriber base that adds progressively more new subscribers each year. While this is a positive sign for the future of the mobile industry over all, it has significant potential impact on PCS viability. In recent years, it was assumed that the mobile radio industry would still be in its infancy in terms of penetration at the time of new PCS carrier launch. In this scenario, PCS carriers would compete with incumbent services for new subscribers. However, with the rapid growth recently experienced by cellular, total wireless penetration will likely be higher than anticipated at the time that new PCS carriers commence services. If PCS licenses are significantly delayed, this would shift part of the focus of PCS carriers to take away subscribers from existing carriers. This entry strategy can be more difficult and expensive for a new entrant, and may reduce the viability of PCS in marginal areas.

New PCS will contribute to increased competition between services in the future.

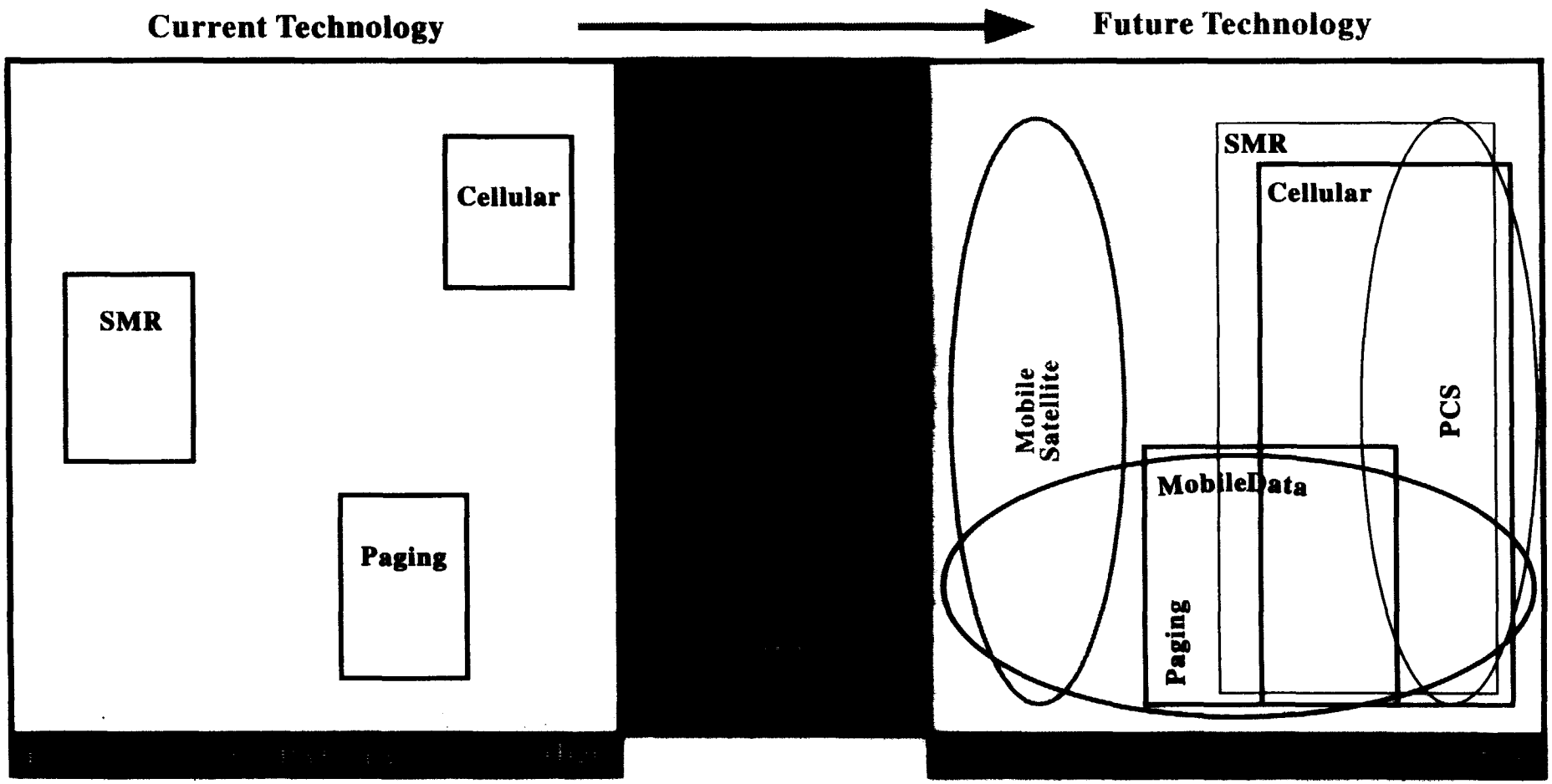
The competition between cellular and PCS is one aspect of the reality of increased cross-competition of services in the future. In the past, cellular, SMR, and paging serviced unique market segments and experienced little competition among services (see Figures 4 and 5). With the development of new digital communications technologies and the focus by all market segments on new consumer markets, mobile technologies will increasingly find themselves in competition for the same customers. This competition will exhibit itself in competition for control of distribution channels, falling equipment and service prices, and attempts to develop consumer loyalty through the development of brands. The introduction of new PCS carriers will significantly add to cross-technology competition.

Figure 4 Mobile Communication Target Markets by Technology



Source:EMCI,Inc.

Figure 5 Mobile Communication Services Capabilities and Functionality



Source: EMCI, Inc.

There is substantial potential for the marriage of licensed and unlicensed (in-building) new PCS.

One area of potential differentiation for new PCS carriers is the marriage of licensed and unlicensed applications. EMCI projects that a critical application of the unlicensed bands will be wireless PBX (WPBX). The allocation of frequency for unlicensed applications adjacent to licensed PCS bands will create the opportunity for multi-mode handsets permitting both private WPBX and public licensed operation. There is significant potential demand for these services.

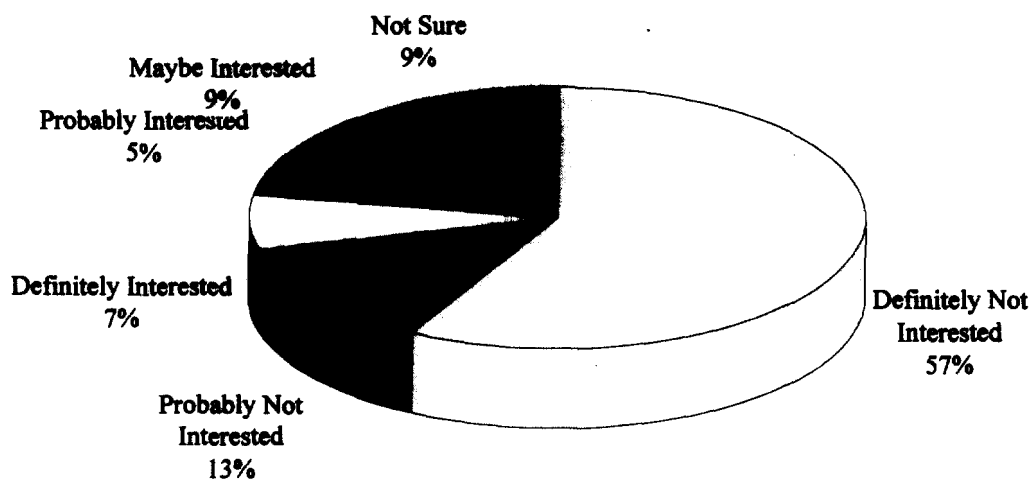
In survey research, EMCI found that the seven percent of existing cellular users were definitely interested in having a WPBX at their place of work (see Figure 6). This demand increases to 10 percent of cellular users if the system offered both private in-building WPBX and access to cellular on the same handset (see Figure 7). Interest levels are considerably higher among cellular users that use their telephones primarily for business (17 percent definitely interested). While any technology should be able to offer combined WPBX/public wireless services (this type of service is now offered by some cellular carriers), new PCS may have a unique advantage with this service concept with unlicensed bands allocated adjacent to the new PCS frequencies.

PCS economics vary widely across markets and license types.

In EMCI's recent study, PCS: Market Demand and System Engineering, the economics of PCS licenses in every continental MTA and BTA were studied based on EMCI's study of local market demand characteristics and MLJ's system design and capital costs. The study reports the following findings:

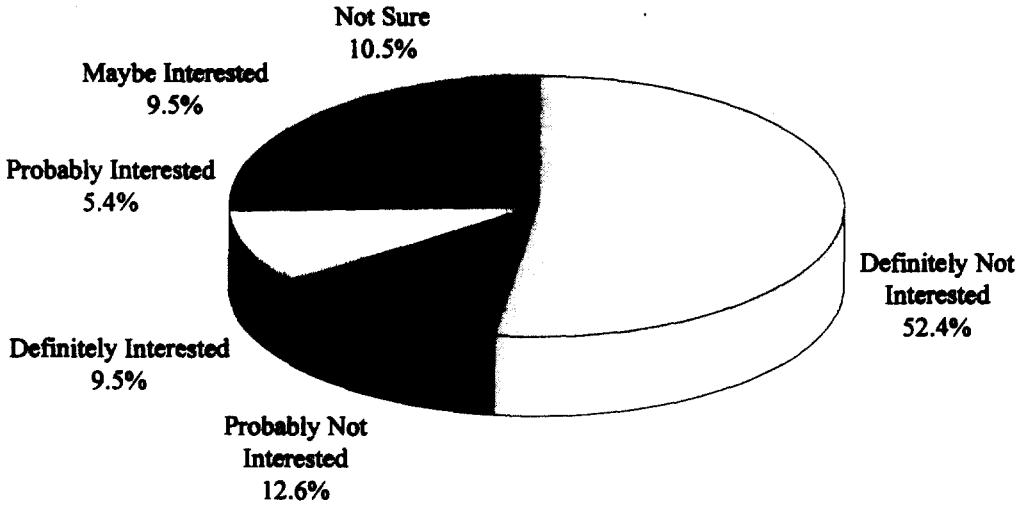
- While virtually all MTA licenses appear viable, there is tremendous variance of economic performance. This variance is related to the distribution and density of demand and local network design challenges due to the market's topography.
- Many 20 MHz BTA licenses appear to be viable as a stand-alone high mobility PCS business particularly in the large urban markets.
- A large majority of 10 MHz licenses do not appear to be viable as a high mobility PCS system without substantial support and subsidy from a related wireless enterprise.
- Projected costs of microwave relocation vary widely across markets and its impacts are not proportionate to spectrum size (e.g. 10 MHz licenses are in some cases disproportionately exposed to relocation costs.)

Figure 6 Interest in Using a Wireless PBX Phone in Workplace
Cellular Phone User Group
All Markets



Source: EMCI, Inc., Second Quarter, 1993

Figure 7 Interest in Dual Mode Cellular-PBX Phone Cellular Phone User Group All Markets



Source: EMCI, Inc., Second Quarter, 1993.

Conclusions

- The wireless market should achieve 87 million voice subscribers by the year 2004. There will be additional messaging and unlicensed users. Total subscribers will be lower if PCS licensing is delayed.
- Services for PCS are evolutionary and not in a separate class from other mobile services. Technology will tend to be portable across service types.
- Consumers increasingly demand integrated wide-area services. PCS license definitions which do not facilitate wide-area service integration will negatively impact new PCS viability.
- The greatest potential growth segment for mobile services is upper-middle income consumers with household income from $30,000 to $65,000.
- There is great potential for the integration of licensed and unlicensed new PCS, particularly in the area of WPBX.